United States
Environmental Protection
Agency

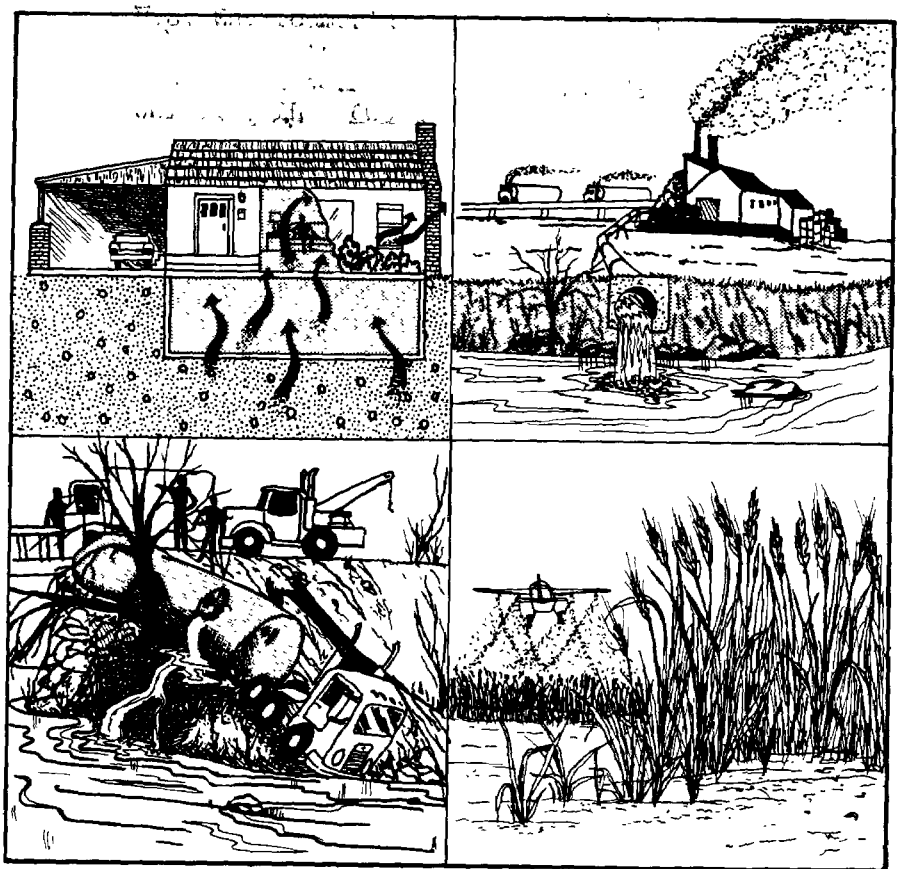
EPA 230-09-90-082
September 1990

Policy, Planning, And Evaluation (PM-221)

EPA

Understanding Environmental Health Risks And Reducing Exposure

Highlights Of A Citizen's Guide

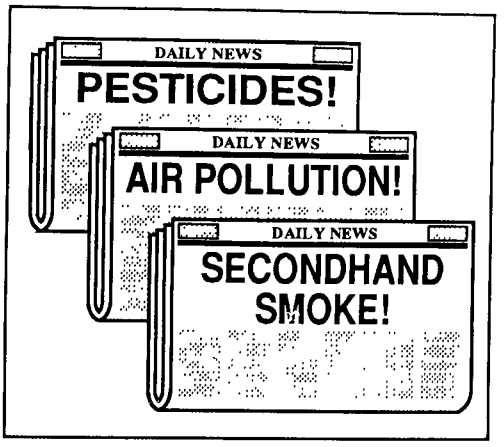


Printed on Recycled Paper

Risk Communication Series

How Can You Find Out Whether Your Environment Is Harmful?

Every day the news media tell us about the harmful effects of hazardous substances in our environment. For the concerned citizen, these media statements often create more questions than they answer. You may ask these questions:



- How many people are likely to be exposed to hazardous substances, and will these exposures make them sick?
- What is the government doing to reduce my exposure?
- What actions can I take on my own to reduce my exposure?

Scientists have developed ways to assess how many people may be exposed to hazardous substances and their risks from those exposures. The next two pages describe these methods.

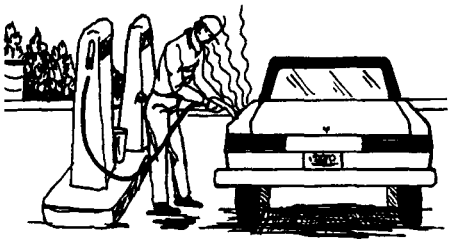
Federal and state governments use information about risks to develop regulations for reducing your exposure. Page 4 describes the U.S. Environmental Protection Agency's (EPA's) role in developing and enforcing these environmental regulations.

At the community level, both government and nongovernmental programs have been developed to reduce your exposure to hazardous substances. And, on a personal level, you can change habits to reduce your exposure even more. Pages 6 and 7 describe community and personal actions to reduce your exposure to hazardous substances.

This flyer should begin to answer your questions about hazardous substances in your environment, but you may want to know more. EPA has prepared a 125-page guidebook to help people understand environmental risks so they can make informed decisions about their exposure to hazardous substances. The guidebook also contains a list of government and nongovernmental sources of additional information on hazardous substances. To order the guidebook fill out and return the request form at the bottom of page 7.

How Does EPA Estimate Your Exposures to Hazardous Substances?

Hazardous substances come from **man-made sources** such as commercial facilities that make, treat, store, use, or dispose of hazardous substances; sewage and water treatment plants; and consumer products such as gasoline, household cleaners, pesticides, and paint solvents. Hazardous substances also can come from **natural sources** such as naturally occurring minerals or gases and from naturally occurring pesticides in plants used for food.

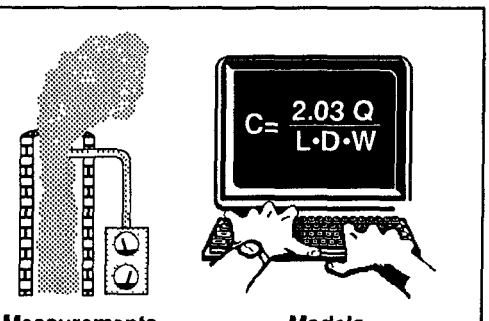


Transport of benzene from gasoline to air near pump

Hazardous substances can be released **routinely**, for example, during normal operations of a factory, water-treatment plant, or other government or commercial enterprise and during normal use of a car or a pesticide. Hazardous substances also can be released **accidentally**, for example, during fires, explosions, and transportation accidents.

Hazardous substances are transported by many different **pathways** through the air, water, soil, or food to get to you.

EPA needs to know the identity of a hazardous substance, the type of release, and the pathway to your environment before estimating the concentration of a hazardous substance in your environment. EPA either measures the concentration directly or uses mathematical models to estimate it. Because so many substances could be hazardous, however, EPA has done this for only some substances in your environment.



Measurements **Models**

Your **exposure** depends on how much of a hazardous substance you take into your body when breathing, eating, or drinking. EPA estimates your exposure by multiplying the concentration of the hazardous substance in your environment by conversion factors for each type of exposure — such as the amount of water drunk per day.

■ How Does EPA Estimate Your Risk of Illness? ■

You already have some risk, or chance, of getting any illness during your lifetime. Your increased **risk of illness** is the likelihood that exposure to a hazardous substance will increase your chance of getting that illness.

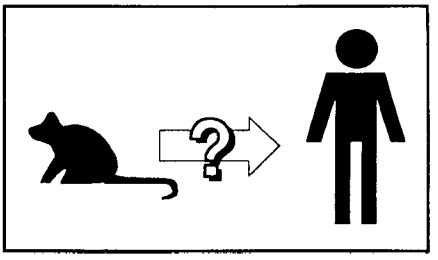
Some hazardous substances cause harmful effects at smaller exposures than others. EPA uses **dose-response relationships** to estimate how much increased exposure to a hazardous substance increases the risks of various illnesses.

Of course, scientists cannot perform experiments on humans. Some human information is available (for example, for workers exposed to benzene on the job), but scientists usually rely on animal experiments to give information for dose-response relationships.

EPA computes increased risk of illness in terms of the number of **extra cases of an illness expected in a population**. Multiplying the number of extra cases expected for each unit of exposure (estimated using the dose-response relationship) by people's actual exposure (see discussion on page 3) gives the number of cases predicted for that population.

$$\text{Extra Cases of Illness} = \text{Cases for Each Unit of Exposure} \times \text{Exposure}$$

EPA's risk-of-illness estimates are only rough estimates of the human health effects. This is because scientists lack complete information about human exposures to hazardous substances and about how these substances actually harm human cells.



EPA scientists make adjustments to the risk-of-illness calculations to be sure they do not underestimate the number of illnesses that would occur from an exposure. That way, regulations that EPA develops based on these estimates provide an extra level of protection of human health.

One way to judge the seriousness of a risk is by the size of your exposure and the associated health risks. But people also consider other **characteristics** of the risk such as whether it is voluntary or involuntary. For example, two risks may be the same size, but you may be more willing to tolerate one because it is associated with an activity you can control (such as your job) versus the other, which is associated with an activity you cannot control (such as a pesticide residue in food).

What Is the Government Doing to Reduce Your Exposure to Hazardous Substances?

In the past two decades, the U.S. Congress has passed many laws to protect the environment and people from exposure to hazardous substances. EPA administers most laws concerning pollution in the outdoor environment and provides information on pollutants in indoor air. EPA's responsibilities include

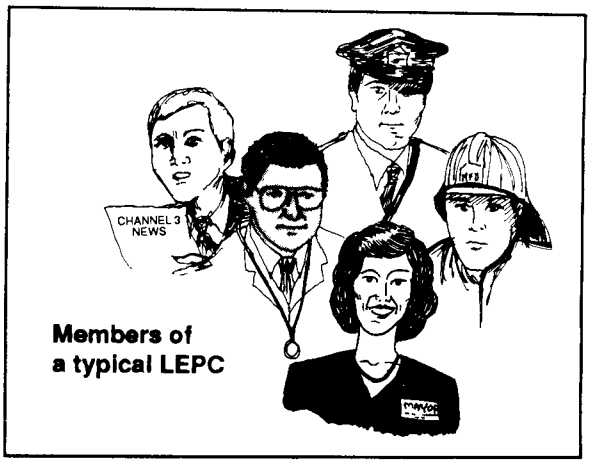
- setting and enforcing standards under environmental laws,
- developing and testing new methods to reduce the sources of environmental risks,
- requiring the cleanup of sites where damage from hazardous substances already has occurred,
- administering programs to provide information to the public and businesses about regulatory requirements, environmental programs, procedures to reduce exposures to hazardous substances, and the health effects of hazardous substances,
- assisting state and local governments in planning for emergencies, and
- coordinating the efforts of local government groups.

To set and enforce standards under environmental laws, EPA uses the information from exposure and risk of illness estimates (described on pages 3 and 4 of this flyer). Protecting people and the environment from damage caused by pollution to the air, soil, surface water, and ground water is the major focus of these environmental laws. They cover sources such as factories, power plants, cars, hazardous waste facilities.

Government actions both provide benefits and impose costs. For example, people and the environment benefit because the risk of harmful effects is reduced, but regulations can cause increased prices of some goods and services and reduced employment in some industries.

EPA considers these and other benefits and costs when setting standards — focusing on the environmental problems that pose the most significant and serious risks. But broader social concerns — often driven by public perceptions of the seriousness of risks — also play a role in EPA's decisionmaking process.

What Is Your Community Doing to Reduce Your Exposure to Hazardous Substances?



Members of a typical LEPC

One example of what communities are doing is through the Local Emergency Planning Committee (LEPC). This local group is charged with developing a plan for evacuation or emergency response to an accident involving hazardous substances. LEPCs were established under federal law in 1986, and there are now about 4,000 LEPCs nationwide. LEPCs include representatives from all parts of the community, including volunteer citizen representatives. You can volunteer to serve on your community's LEPC. The chemical industry is actively involved with LEPCs and often provides technical assistance, information, and equipment.

In addition to developing an emergency plan for the community, LEPCs can provide public access to information about

- hazardous substances that are used and stored by facilities in the community,
- accidental releases that have occurred in the community, and
- routine releases that are occurring in the community,

The LEPC's ability to focus community attention on the releases and inventories of chemicals at facilities in the community has forced some facilities to rethink their chemical housekeeping practices.

In addition to your LEPC, other organizations or agencies in your community, such as local environmental and public health agencies, provide helpful services and information. You and your neighbors can use these resources to organize other activities to reduce hazardous substances in your community. You might want to organize a household hazardous waste collection program or information programs aimed at problems in your community.

What Can You Do to Reduce Your Exposure to Hazardous Substances?

You can take various actions on your own to reduce your exposure to hazardous substances. Indoor exposures to radon, asbestos, indoor tobacco smoke, lead in paint, lead in drinking water, and others may pose dangers to you and your family. Get information about these exposures and how to reduce them.

Many consumer products such as ho... pesticides contain hazardous substances. Select and use these products carefully — or use less hazardous alternatives. **Read labels** and follow instructions for proper use.

If you have an accident with a pesticide or other hazardous substance, **consult the label** for first aid information. Then **call your local poison control center** (get the number from the inside cover of your telephone book) for further instructions.

You also can **change habits** such as living or working around environmental tobacco smoke, spending time outdoors when air quality is poor, or swimming in or eating fish from contaminated water bodies.

Diet is important for two reasons. First, removing surface residues from vegetables and trimming the fat from meat and poultry products can reduce your risk of exposure to pesticides. Second, people who eat healthy diets are less susceptible to harm from hazardous substances.

Summary

Regulatory and other actions by federal, state, and local governments reduce your exposure to hazardous substances in the environment. Through individual and community actions you can do even more to prevent the harmful effects of such exposures. Following the suggestions outlined here is a first step — if you are interested in getting EPA's 125-page guidebook that provides more information, please fill out and return the order form below.

Request Form

Please send me a copy of *Hazardous Substances in Our Environment: A Citizen's Guide to Understanding Health Risks and Reducing Exposure,* EPA-230-09-90-081.

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

Mail request to:

Public Information Center PM-211B
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Or call (202) 382-2080 or (202) 475-7751